

**APPENDIX C**  
**BENTHIC INVERTEBRATE, FISH**  
**AND EPIBENTHIC INVERTEBRATE DATA**

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## Data Analyses

### Benthic Invertebrates

The five benthic invertebrate samples from each station were treated as replicates, allowing calculation of a mean number/m<sup>2</sup> and standard deviation for each species, and total mean number/m<sup>2</sup> and standard deviation for each station. Two community structure indices, diversity and species equitability, were also calculated for each station. Community species diversity was calculated using the Shannon-Weiner function (H), which contains two components: number of species and proportional abundance of individuals among the species (Krebs 1978).

$$H = - \sum_{i=1}^s p_i \log_2 p_i$$

where  $p_i = n_i/N$  ( $n_i$  is the number of individuals of a particular species in the sample, and N is the total number of all individuals in the sample) and s = number of species. The second community structure index was Evenness (E), which measures the proportional abundances among the various species in a sample (Krebs 1978). Evenness (E) has a possible range of 0.00 to 1.00, with 1.00 indicating all species in the sample are numerically equal.

$$E = H/\log_2 s$$

where H = Shannon-Weiner function and s = number of species.

Principal component analysis (PCA), a multivariate statistical technique, was used to identify species distribution and abundance patterns for each survey. PCA was conducted using a Pearson correlation matrix with varimax rotation. Rotated component loadings (i.e., corelation coefficents)  $\geq 0.5$  were used to define station groupings. If a station had component

loadings  $\geq 0.5$  on more than one component, then that station was grouped where it had the highest loading value. The PCA was performed using the Factor procedure of Systat: The System for Statistics (Wilkinson 1989) on a Macintosh computer. The non-parametric Kruskal-Wallis one-way analysis of ranks (Ryan et al. 1985) was used to compare benthic invertebrate densities, number of taxa, H, and E values between surveys. This test was used instead of an Analysis of Variance because yearly variances were not homogeneous, both before and after various data transformations.

#### Fishes and Large Epibenthic Invertebrates

By using distance fished, fishing width of the trawl, and catch data, we estimated densities of fishes and large epibenthic invertebrates [number/hectare(ha)]. With the use of various computer programs, a descriptive summary of each trawling effort was produced, which included a species list, numbers and weights of fishes and large epibenthic invertebrates captured (total and by species), number/ha (total and by species), weight/ha (total and by species), and the previously described community structure indices. Length-frequency distributions of six dominant fish species and width-frequency distribution for Dungeness crab were used to define the size-class structures of the major species in the study area. Histograms were made by grouping individual total lengths for each species into 5-mm increments; fish  $>300$  mm were included in the 296 to 300-mm interval.

We used a Kruskal-Wallis nonparametric test (Ryan et al. 1985) to compare densities (number/ha) between surveys. A nonparametric test was performed because these data were not normally distributed.

Appendix C Table C-1.--Loran-C navigational readings of benthic invertebrate, sediment, and bottom trawling stations at and adjacent to ODMDS F, offshore from the Columbia River, during summer (June-August) 1989 through 1992.

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Benthic invertebrate and sediment station locations<sup>a</sup>

<u>Station</u>	<u>Depth, ft. (m)</u>	<u>Loran reading</u>
SF-A4 <sup>b</sup>	162 (49.4)	12112.0
SF-B2	153 (46.6)	12108.4
SF-B6	147 (44.8)	12111.6
SF-C3	138 (42.1)	12107.0
SF-C5	138 (42.1)	12108.5
SF-D1	138 (42.1)	12103.0
SF-D4	132 (40.2)	12106.6
SF-D7	129 (39.2)	12110.0
SF-E3	126 (38.4)	12105.0
SF-E5	126 (38.4)	12106.0
SF-F2	114 (34.7)	12101.0
SF-F6	114 (34.7)	12105.0
SF-G4	105 (32.0)	12101.0
		28022.6
		28022.8
		28023.4
		28023.
		28023.8
		28023.6
		28024.1
		28024.3
		28024.3
		28024.8
		28024.9
		28025.5
		28025.6

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<sup>a</sup>Station locations were the same for all years.

<sup>b</sup>Main text, Table C-3 and all drawings do not list the "SF" prefix.

Appendix C Table C-1.--Continued.

Trawling locations

Station	Mean depth, ft (m)	<u>Loran readings</u>			
		Beginning	Ending		
<b>June 1989</b>					
FS	135 (41.1)	12112.7	28023.7	12111.8	28023.5
FM	135 (41.1)	12109.0	28024.0	12106.4	28024.0
FN	135 (41.1)	12103.0	28023.9	12102.0	28024.1
<b>June 1990</b>					
FS	137 (41.8)	12111.3	28023.7	12111.4	28022.5
FM	121 (36.9)	12107.7	28024.0	12106.3	28023.5
FN	124 (37.8)	12103.1	28023.9	12102.1	28024.0
<b>August 1991</b>					
FS	125 (28.1)	12111.5	28024.2	12109.8	28024.3
FM	126 (38.4)	12108.8	28024.1	12107.6	28024.6
FN	110 (33.5)	12002.3	28024.2	12101.0	28024.1
<b>July 1992</b>					
FS	132 (40.1)	12111.4	28024.0	12109.8	28024.1
FM	124 (37.8)	12108.0	28024.2	12106.3	28024.6
FN	109 (33.2)	12102.0	28024.2	12100.4	28024.5

Appendix C Table C-2.--Benthic invertebrate taxa (mean number/m<sup>2</sup>) collected by box corer at and adjacent to ODMDS F, offshore from the Columbia River, during June/July 1989 to 1992.

Taxa	1989	1990	1991	1992	YEAR
Cnidaria					
Anthozoa			0.3	6.5	
Platyhelminthes					
Turbellaria				0.3	1.4
Nemertinea					
Paleonemertea	2.1				15.5
Heteronemertea	0.2				
Nemertea	70.5	60.2	105.5	176.8	
Nematoda	0.2				
Annelida					
Polychaeta					
Aphroditidae					
<i>Aphrodita</i> spp.				0.2	
Polynoidae	0.3	1.8	4.8	9.8	
<i>Tenonia priops</i>	1.6	0.5		19.1	
Sigalionidae				1.2	0.3
<i>Pholoe minuta</i>	0.5	2.0	1.8	19.6	
<i>Sthenelais</i> spp.			0.3	0.2	
<i>Sthenelais berkeleyi</i>	1.0	0.2	22.7	7.5	
<i>Sthenelais tertieglabra</i>	1.1	1.6	0.8	0.3	
<i>Sigalion</i> spp.		0.5			
<i>Sigalion mathildae</i>				0.2	
<i>Thalenessa</i> spp.				0.2	
<i>Thalenessa spinosa</i>	0.8	0.8	0.2		
Phyllodocidae	0.2	3.7	8.4	3.7	
<i>Eteone californica</i>		1.3			
<i>Eteone fauchaldi</i>	2.2	3.6	2.6	3.4	
<i>Eteone longa</i>	0.5	1.3	37.0	8.0	
<i>Eteone</i> spp.	0.6	3.9	1.0	4.5	
<i>Paranaitides polynoides</i>	0.5	2.0	0.2	1.1	
<i>Phyllodoce</i> spp.		1.1	10.3	29.3	
<i>Phyllodoce groenlandica</i>	0.8	0.3	6.3	2.9	
<i>Phyllodoce hartmanae</i>	9.3	12.0	15.2	93.6	
<i>Phyllodoce medipapillata</i>			0.7		
<i>Phyllodoce multipapillata</i>	0.3	0.5			
<i>Phyllodoce papillosa</i>	0.3				
Hesionidae					
<i>Gyptis brevipalpa</i>	1.1			0.3	
<i>Microphthalmus</i> spp.	0.5	1.3	7.3	0.6	
<i>Microphthalmus sczelkowii</i>			2.6		
<i>Heteropodarke heteromorpha</i>			6.7	5.6	
				1.3	

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
Syllidae	1.4	5.2	1.2	3.0
<i>Autolytus cornutus</i>		0.2		0.5
<i>Ehlersia heterochaeta</i>				0.5
<i>Syllis spp.</i>	0.3			
<i>Syllis hyalina</i>	0.2			
Nereidae		0.2	0.2	10.6
<i>Nereis spp.</i>			0.3	
<i>Nereis neoneanthes</i>			0.3	
<i>Nereis zonata</i>	0.5	1.0		
Nephtyidae				1.1
<i>Nephtys spp.</i>	80.2	178.4	181.3	71.0
<i>Nephtys caeca</i>	0.2	0.3	6.5	36.7
<i>Nephtys caecoides</i>	43.8	62.5	99.9	161.1
<i>Nephtys cornuta cornuta</i>				0.2
<i>Nephtys ferruginea</i>	0.5			
Sphaerodoridae				
<i>Sphaerodoropsis minuta</i>				0.2
<i>Sphaerodorepsis spaerulifer</i>			0.3	
Glyceridae				0.2
<i>Glycera spp.</i>		0.2	0.8	
<i>Glycera americana</i>		0.3		0.5
<i>Glycera capitata</i>	0.2	0.5	0.3	1.0
<i>Glycera convoluta</i>		0.2		
<i>Glycera robusta</i>		0.2		
Goniadidae			3.3	0.8
<i>Glycinde spp.</i>			4.3	25.8
<i>Glycinde armigera</i>	33.3	149.1	96.6	334.4
<i>Glycinde picta</i>			20.0	27.4
<i>Goniada brunnea</i>	7.5	9.8	5.1	5.6
<i>Goniada maculata</i>			7.9	
Onuphidae	0.6	0.8		8.7
<i>Onuphis spp.</i>	8.8	0.7		1.0
<i>Onuphis iridescent</i>	0.6	31.4	22.5	6.1
<i>Onuphis elegans</i>	19.9			0.2
Lumbrineridae				2.6
<i>Lumbrineris spp.</i>	1.8	4.1	21.0	2.7
<i>Lumbrineris bicirrata</i>	2.9	8.5	10.4	3.8
<i>Lumbrineris cruzensis</i>				0.2
<i>Lumbrineris californiensis</i>				1.4
<i>Lumbrineris luti</i>	0.2		6.5	
<i>Lumbrineris limicola</i>	0.2		1.5	
Arabellidae			0.3	
<i>Notocirrus spp.</i>			0.5	
<i>Dorvillea spp.</i>			0.3	

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
Orbiniidae		7.0	1.0	24.5
<i>Leitoscoloplos pugettensis</i>	72.3	143.6	112.6	39.8
<i>Naineris uncinata</i>			0.2	
<i>Scoloplos</i> spp.			0.2	
<i>Scoloplos armiger</i>	3.2		1.5	1.3
<i>Orbinia (Phylo) felix</i>	11.7	18.6	13.6	6.6
Paraonidae			1.8	
<i>Aricidea</i> spp.			1.2	0.5
<i>Aricidea (Acesta) catherinae</i>	0.5			0.3
<i>Aricidae lopezi</i>				0.2
<i>Aricidea suecica</i>		1.1		
<i>Aricidae quadrilobata</i>		0.2		
<i>Paraonella platybranchia</i>	1.0	4.1	0.2	1.8
Spionidae	0.3		22.3	0.3
<i>Laonice</i> spp.			0.2	
<i>Laonice cirrata</i>	0.6	0.8	1.2	
<i>Paraprionospio pinnata</i>				0.3
<i>Polydora</i> spp.			0.2	0.2
<i>Polydora cornuta</i>			0.2	
<i>Polydora brachycephala</i>		0.3	26.0	0.5
<i>Polydora socialis</i>		0.2		0.6
<i>Prionospio</i> spp.			0.3	
<i>Prionospio steenstrupi</i>	0.2		1.2	
<i>Prionopsio lighti</i>	2.4	14.2	164.2	42.5
<i>Spio</i> spp.		0.3	2.0	0.6
<i>Spio filicornis</i>	1.4	0.3	1.2	0.2
<i>Spio butleri</i>		0.5		1.8
<i>Polydora (Boccardia) pugettens</i>		1.0		0.2
<i>Boccardia</i> spp.			0.5	
<i>Spiophanes</i> spp.			161.1	
<i>Spiophanes bombyx</i>	69.4	359.2	303.5	1309.2
<i>Spiophanes berkeleyorum</i>	68.6	268.3	382.9	1200.2
<i>Scolelepis</i> spp.				3.2
<i>Scolelepis squamata</i>		0.2		0.3
Magelonidae				
<i>Magelona</i> spp.		5.2	55.7	35.6
<i>Magelona berkeleyi</i>				0.6
<i>Magelona hobsonae</i>			3.3	1.9
<i>Magelona longicornis</i>	7.9	33.2	23.8	13.0
<i>Magelona sacculata</i>	60.9	250.2	384.2	312.3
Trochochaetidae				1.9
<i>Trochochaeta multiseta</i>	0.2			

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
<b>Chaetopteridae</b>			14.6	16.0
<i>Spiochaetopterus</i> spp.			4.6	
<i>Spiochaetopterus costarum</i>		1.5	0.3	3316.4
<i>Mesochaetopterus taylori</i>		0.8		1.0
<b>Cirratulidae</b>	0.2	1.6	22.0	0.3
<i>Aphelochaeta</i> spp.	0.2		3.1	
<i>Aphelochaeta multifilis</i>		0.2	3.8	0.2
<i>Chaetozone</i> spp.			0.7	0.3
<i>Chaetozone setosa</i>	1.8			
<i>Chaetozone spinosa</i>	72.9	62.0	175.0	137.4
<b>Flabelligeridae</b>				0.3
<i>Flabelligera affinis</i>				0.3
<b>Opheliidae</b>			0.2	1.8
<i>Armandia brevis</i>			0.2	15.5
<i>Ophelia</i> spp.		0.2		0.2
<i>Travisia</i> spp.		0.5		0.2
<i>Travisia brevis</i>		0.2		
<i>Travisia japonica</i>	0.2			
<b>Capitellidae</b>	0.2	0.7	0.3	0.5
<i>Barantolla americana</i>				0.2
<i>Capitella capitata complex</i>	0.2			0.3
<i>Decamastus gracilis</i>	8.5	7.3	2.3	0.5
<i>Heteromastus filiformis</i>		0.2		0.3
<i>Heteromastus filobranchus</i>	0.2	4.1	0.2	0.5
<i>Heteromastus</i> spp.			0.7	
<i>Mediomastus californiensis</i>	0.5	3.7	20.3	2.7
<i>Mediomastus</i> spp.		0.2	1.0	6.7
<i>Notomastus lineatus</i>	9.5	8.8	0.2	2.4
<i>Notomastus tenuis</i>	0.2		0.2	0.3
<i>Notomastus</i> spp.			6.5	
<b>Arenicolidae</b>			0.2	
<i>Abarenicola</i> spp.				
<b>Maldanidae</b>	0.3	0.2		1.0
<i>Asychis</i> spp.		0.7		
<i>Euclymene</i> spp.				0.2
<b>Oweniidae</b>				
<i>Owenia fusiformis</i>	0.2	8.5	0.3	622.3
<i>Galathowenia oculata</i>		0.5	7.3	0.3
<b>Pectinariidae</b>				
<i>Pectinari</i> spp.			0.3	14.4
<i>Pectinaria californiensis</i>				8.0

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
<b>Ampharetidae</b>			1.7	4.0
<i>Ampharete</i> spp.			2.5	1.3
<i>Ampharete acutifrons</i>	1.1	2.9	0.5	1.9
<i>Ampharete labrops</i>			0.2	
<i>Ampharete finmarchica</i>	0.6			
<b>Terebellidae</b>		0.2	0.8	0.3
<i>Pista</i> spp.			0.8	
<i>Polycirrus</i> spp. complex	0.6	4.4		1.1
<b>Sabellidae</b>			0.2	
<i>Chone dunneri</i>		0.2		
<i>Euchone hancocki</i>		0.3		0.2
<i>Euchone incolor</i>	0.3			
<b>Oligochaeta</b>		0.5		0.3
<b>Hirudinea</b>	0.2	0.3		
<b>Gastropoda</b>	1.9	0.5	2.6	1.4
Archaeogastropoda				
<b>Turbinidae</b>			0.2	0.3
<i>Spiromoellaria quadrae</i>			0.2	
Mesogastropoda				
<b>Lacunidae</b>			0.2	0.2
<i>Lacuna</i> spp.			0.2	
<b>Naticidae</b>	0.2			
<i>Polinices</i> spp.	0.2			
<i>Nitudella gouldi</i>	14.1	22.0	36.9	58.7
<b>Nassariidae</b>				
<i>Nassarius</i> spp.			4.1	12.8
<i>Nassarius mendicus</i>	1.0	0.8	1.3	1.1
<i>Nassarius fossatus</i>			1.0	1.4
<i>Nassarius perpinguis</i>		0.2	0.2	
<b>Olividae</b>				
<i>Olivella</i> spp.	6.1	9.9	1.0	109.0
<i>Olivella biplicata</i>	1.6	1.6		
<i>Olivella cf. biplicata</i>		0.7		
<i>Olivella baetica</i>	1.6	19.5	513.2	238.5
<i>Olivella pycna</i>	8.8	57.8	3.5	57.4
<b>Turridae</b>			0.2	0.6
<i>Oenopata</i> spp.				1.4
<i>Kurtziella plumbea</i>	1.1	1.6	4.0	2.2
<b>Pyramidellidae</b>				
<i>Odostomia</i> spp.	0.5	2.1	2.8	2.1
<i>Turbonilla</i> spp.		0.7	1.3	1.0

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
<b>Cylichnidae</b>				
<i>Cylichna</i> spp.	0.5	0.5		
<i>Cylichna attonsa</i>	2.7		8.6	5.0
<i>Cylichna alba</i>		5.0		
<b>Scaphandridae</b>				
<i>Scaphander willetti</i>			0.2	7.4
<b>Aglajidae</b>				
<i>Melanochlamys diomedea</i>	0.5	1.8	6.9	0.5
<i>Melanochlamys cf. diomedea</i>	0.3	0.5		
<b>Gastropteridae</b>				
<i>Gastropteron pacificum</i>	0.3		4.5	77.6
<b>Diaphanidae</b>				
<i>Diaphana</i> spp.			0.8	11.9
<i>Cuthona</i> spp.		0.2		
<b>Gymnosomata</b>				0.3
<b>Aplacophora</b>				
<b>Chaetodermatidae</b>				
<i>Chaetoderma</i> spp.				0.6
<b>Pelecypoda</b>				
<b>Nuculidae</b>				
<i>Acila castrensis</i>	12.5	5.7	0.8	2.4
<i>Nucula tenuis</i>	0.2			
<i>Yoldia</i> spp.	1.3	3.7	2.8	1.9
<i>Yoldia myalis</i>	1.9	3.7	5.6	8.5
<i>Yoldia scissurata</i>			0.2	0.6
<b>Mytilidae</b>				
<b>Montacutidae</b>				
<i>Mysella tumida</i>	0.3	7.7	7.6	4.2
<i>Pseudopythina rugifera</i>			0.5	
<b>Thyasiridae</b>				
<i>Axinopsida serricata</i>	22.9	37.8	50.3	49.9
<b>Cutellidae</b>				
<i>Siliqua</i> spp.			0.2	227.2
<i>Siliqua patula</i>	0.3	0.3	0.5	
<i>Siliqua sloati</i>				1.0
<i>Solen sicarius</i>				1.3
<b>Tellinidae</b>				
<i>Macoma</i> spp.	2.9	4.1	17.9	38.3
<i>Macoma calcarea</i>		4.1	1.5	0.2
<i>Macoma cf. lama</i>		0.3		
<i>Macoma carlottensis</i>		0.5		
<i>Macoma balthica</i>		2.8		
<i>Macoma cf. balthica</i>		0.5		
<i>Macoma secta</i>				0.2
<i>Tellina</i> spp.	9.5	1.3	23.7	3.8

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
<i>Tellina carpenteri</i>		1.5		0.3
<i>Tellina modesta</i>	0.5	0.8		0.5
<i>Tellina cf. modesta</i>		0.2		
<i>Tellina cf. bodegaensis</i>	0.5	0.2		
Pandoridae				
<i>Pandora</i> spp.				0.2
<i>Pandora filosa</i>		0.3	0.2	0.2
<i>Pandora punctata</i>			0.5	0.5
Scaphopoda			0.2	0.2
Arthropoda		0.2		0.3
Arachnida				
Crustacea				
Ostracoda	0.2		0.2	
Ostracoda sp. 2	0.2			
<i>Podon</i> spp.		0.2		
Cylindroleberididae	4.8	9.1	6.9	31.4
<i>Bathylyberis</i> spp.	0.2		11.2	
Philomedidae				9.8
Cypridinidae				
<i>Euphilomedes</i> spp.				3.4
<i>Euphilomedes carcharodonta</i>	22.6	38.1	51.1	81.3
Calanoida copepoda				*a
Harpacticoida copepoda				*
<i>Clausidium vancouverense</i>				*
Cirripedia		*		*
<i>Balanus</i> spp.		*		*
Leptostraca				
Nebaliidae				
<i>Nebalia</i> spp.			0.3	
<i>Nebalia pugettensis</i>	0.3	0.3	1.2	2.4
Mysidacea				
Mysidacea				
Mysidae	0.2			
<i>Acanthomysis columbiae</i>	*			*
<i>Acanthomysis macrops</i>		*		
<i>Archaeomysis grebnitzkii</i>	2.4	3.6	3.3	0.2
<i>Neomysis</i> spp.		*		
<i>Neomysis kadiakensis</i>		*		*
<i>Neomysis rayii</i>	*			
Cumacea		6.8	0.2	0.3
Lampropidae				
<i>Hemilamprops</i> spp.				0.2
<i>Hemilamprops californica</i>		33.5		24.0

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
<b>Leuconidae</b>				
<i>Leucon</i> spp.	0.8	0.2	19.4	
			8.6	44.4
<b>Diastylidae</b>				
<i>Diastylis</i> spp.	0.3	0.2	5.3	
	0.2	4.1	48.8	11.4
<i>Diastylopsis</i> spp.	0.2		104.7	1.3
<i>Diastylopsis dawsoni</i>	1.6	4.7	148.7	27.7
<i>Diastylopsis tenuis</i>	0.2	45.4	28.0	34.1
<b>Colurostylidae</b>				
<i>Colurostylis</i> spp.				0.3
<i>Colurostylis occidentalis</i>	0.5	22.1	54.7	1.0
<i>Campylaspis</i> spp.	0.3		0.2	
<b>Nannastacidae</b>				
<i>Cumella vulgaris</i>	0.2			0.2
<b>Tanaidacea</b>				
<b>Leptognathidae</b>				
<i>Leptognathia</i> spp.	0.2			0.3
<b>Isopoda</b>				
<b>Sphaeromatidae</b>				
<i>Tecticeps alascensis</i>			0.2	
<i>Tecticeps pugettensis</i>	0.2	0.3	0.3	
<i>Ancinus granulatus</i>		0.2		0.5
<i>Bathycopea daltonae</i>		0.2		
<b>Idoteidae</b>				
<i>Synidotea</i> spp.		7.2	0.5	5.9
<i>Synidotea</i> cf. <i>nodulosa</i>		0.2		
<i>Synidotea angulata</i>	2.4	17.6	34.9	12.8
<i>Idotea</i> spp.	0.3		0.3	
<i>Edotea</i> spp.				0.2
<i>Edotea sublittoralis</i>	0.2	1.0	3.6	
<b>Munnidae</b>				
<i>Pleurogonium rubicundum</i>		0.8		
<b>Liriopsidae</b>				
<i>Liriopsis pygmaea</i>		0.2		
<b>Amphipoda</b>			0.2	0.2
<b>Gammaridea</b>			0.3	0.2
<b>Atyidae</b>				
<i>Atylus tridens</i>		0.3		
<b>Ampeliscidae</b>				
<i>Ampelisca</i> spp.	0.5		5.5	4.3
<i>Ampelisca macrocephala</i>	1.0		1.0	
<i>Ampelisca pugetica</i>		0.2		
<i>Ampelisca careyi</i>	5.6	19.0	24.6	16.7
<b>Aoroidae</b>				0.3
<i>Aorooides</i> spp.		4.7		

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
<b>Melitidae</b>				
<i>Elasmopus</i> spp.				0.2
<b>Ischyroceridae</b>				
<i>Cerapus</i> spp.				3.8
<b>Corophiidae</b>				
<i>Corophium</i> spp.				0.7
<i>Corophium spinicorne</i>	0.8	1.8	0.5	1.1
<b>Gammaridae</b>				0.3
<b>Haustoridae</b>				
<i>Eohaustorius</i> spp.	2.9	1.5	12.6	1.1
<i>Eohaustorius washingtonianus</i>	0.8	0.3	2.3	
<i>Eohaustorius estuaricus</i>	1.8		29.9	6.7
<i>Eohaustorius sawyeri</i>	0.2		1.7	
<i>Eohaustorius sencillus</i>	57.4	32.2	12.7	36.9
<b>Isaeidae</b>				4.0
<i>Cheirimedia</i> spp.		0.5	9.1	
<i>Cheirimedia zotea</i>			26.3	
<i>Cheirimedia</i> cf. <i>zotea</i>	0.2		0.2	
<i>Gammaropsis</i> spp.				1.1
<i>Photis</i> spp.	2.1	3.4	2.5	10.4
<i>Photis brevipes</i>	0.2		8.9	
<i>Photis macinerneyi</i>	3.0	19.0	39.9	44.7
<i>Photis parvidons</i>	1.0	0.3	7.8	2.7
<i>Protomedea</i> spp.	0.2		7.9	4.6
<i>Protomedea articulata</i>		0.2		87.8
<b>Ischyroceridae</b>	0.2			
<i>Ischyrocerus</i> spp.				0.2
<b>Lysianassidae</b>				
<i>Anonyx</i> spp.	9.1		4.3	
<i>Anonyx</i> cf. <i>liljeborgi</i>	9.3	0.3		
<i>Anonyx liljeborgi</i>			0.7	
<i>Hippomedon</i> spp.				0.2
<i>Lepidepecreum</i> spp.				0.2
<i>Lepidecreum gurjanovae</i>		6.3		0.3
<i>Opisa tridentata</i>	0.2	0.3	0.2	
<i>Orchomene</i> spp.	3.2	0.3	3.6	0.8
<i>Orchomene pacifica</i>	0.8		94.3	0.3
<i>Orchomene pinquis</i>				115.3
<i>Orchomene</i> cf. <i>pinquis</i>	9.6	52.3	7.9	81.4
<i>Pachynus</i> c.f. <i>barnardi</i>		0.2		9.8
<i>Wecomedon</i> spp.	0.2			
<i>Wecomedon wecomus</i>	0.8			
<b>Oedicerotidae</b>	0.2	0.5		
<i>Bathymedon</i> spp.				1.6
<i>Monoculodes</i> spp.	0.6	0.2	1.0	1.1

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
<i>Monoculodes spinipes</i>	1.3	7.0	2.3	
<i>Synchelidium</i> spp.	0.2		41.3	
<i>Synchelidium shoemakeri</i>		8.6	14.4	42.2
<i>Westwoodilla caecula</i>	1.0	2.3	15.5	3.7
<b>Pardaliscidae</b>				
<i>Pardalisca</i> spp.		0.2		
<b>Phoxocephalidae</b>				
<i>Paraphoxus</i> spp.	0.3		4.1	
<i>Paraphoxus cognatus</i>			0.3	
<i>Foxiphalus obtusidens</i>	2.2	0.3	0.5	
<i>Paraphoxus oculatus</i>	0.3	0.8	3.0	
<i>Mandibulophoxus gilesi</i>	0.6	1.1		
<i>Mandibulophoxus uncirostratus</i>		0.2		
<i>Rhepoxyinius</i> spp.	43.1	0.7	100.9	68.1
<i>Rhepoxyinius abronius</i>	26.6	12.7	4.3	16.0
<i>Rhepoxyinius daboia</i>	28.1	83.2	32.7	89.1
<i>Rhepoxyinius heterocuspis</i>	0.6		3.1	
<i>Rhepoxyinius variatus</i>	0.2	0.5	10.3	
<i>Rhepoxyinius tridentatus</i>	0.5	0.3	0.7	
<i>Rhepoxyinius vigitegus</i>	9.3	5.4	12.7	13.5
<i>Eobrolgus spinosus</i>	0.3		3.1	0.3
<i>Foxiphalus major</i>	0.3		23.0	1.4
<b>Pleustidae</b>		0.5		
<i>Parapleustes</i> spp.		6.0		14.9
<i>Parapleustes den</i>				0.3
<b>Stenothoidae</b>	0.2	6.8	3.8	8.0
<b>Synopiidae</b>				
<i>Tiron biocellata</i>		0.3		
<b>Hyperiidae</b>		0.3		
<b>Caprellidae</b>				
<i>Caprella</i> spp.		0.2		
<b>Decapoda</b>				*
<i>Caridea zoea</i>				*
<i>Caridea larvae</i>				*
<b>Crangonidae</b>	*			
<i>Crangon</i> spp.				*
<i>Crangon nigricauda</i>		*		*
<i>Lissocrangon stylirostris</i>				*
<b>Callianassidae</b>	0.2	0.2		
<i>Callianassa</i> spp.	0.3	8.5	6.5	2.6
<i>Callianassa californiensis</i>	0.2		3.6	
<b>Anomura</b>				0.3
<b>Paguridae</b>	0.6	1.1	0.3	0.3
<i>Pagurus</i> spp.	2.4	1.1	8.9	9.9

Appendix C Table C-2.--Continued.

Taxa	YEAR			
	1989	1990	1991	1992
Upogebiidae				
<i>Upogebia</i> spp.	0.8			
<i>Upogebia pugettensis</i>	0.2			
Brachyura				
Cancridae			0.2	
<i>Cancer</i> spp.	0.2	0.2		
<i>Cancer magister</i>			0.2	
Onychophora				
Pinnotheridae				
<i>Pinnixa</i> spp.	0.3	0.5	16.2	0.5
<i>Pinnixa eburna</i>		0.7		1.3
Sipunculidae	0.6		1.5	1.4
Echiura				57.2
Echiuridae				
<i>Arhynchite pugettensis</i>	0.3			
<i>Echiurus echius alaskanus</i>	0.5			
Phoronida	1.0	7.2	35.6	19.2
Phoronidae		4.2	0.3	
Brachiopoda				
Ophiuroidea		8.0		0.5
Amphiuridae	0.8			
<i>Amphiodia</i> spp.	5.8		3.3	47.8
<i>Amphiodia urtica</i>	0.5		9.4	
Ophiuridae				
<i>Ophiura</i> spp.	0.5		0.5	
Echinodermata				
Echinoidea				80.3
Dendrasteridae				
<i>Dendraster excentricus</i>	1.0	4.6	0.8	1.6
Holothuroidea	0.2	1.1	0.7	0.3
Insecta				
Coleoptera				*
Chaetognatha				*
Sagittidae				
<i>Sagitta</i> spp.				*

<sup>a</sup> Taxa found but not considered a benthic invertebrate or not sampled quantitatively and not included in analysis.

**Appendix C Table C-3.--Summary of benthic invertebrates, by station at and adjacent to ODMDS F, offshore from the Columbia River, in June/July 1989, 1990, 1991, and 1992.**

Appendix C Table C-3 is 136 pages long and is therefore not included with this report. A copy of Table C-3 may be obtained from the authors of this report upon request. The table will be provided on MS/DOS or Apple formatted 3.5 inch floppy disc in MS/DOS WordPerfect® 5.1 or Macintosh WordPerfect® 2.0.1 format. Other text formats can be provided however table structure can not be guaranteed.

Appendix C Table C-4.--Fishes and large epibenthic invertebrates captured at and adjacent to Site F, offshore from the Columbia River, with an 8-m bottom trawl in June/July/August 1989, 1990, 1991, 1992.

Scientific name	Common name	Year				
		1989	1990	1991	1992	
<b>Fish</b>						
Squalidae						
<u>Squalus acanthias</u>	Spiny dogfish	x		x		
Rajidae						
<u>Raja binoculata</u>	Big skate	x	x	x	x	
Clupeidae						
<u>Clupea harengus pallasi</u>	Pacific herring		x	x	x	
Engraulidae						
<u>Engraulis mordax</u>	Northern anchovy		x			
Osmeridae						
Larval smelt		x	x	x		
Unidentified smelt				x		
<u>Allosmerus elongatus</u>	Whitebait smelt	x	x	x	x	
<u>Hypomesus pretiosus</u>	Surf smelt		x			
<u>Spirinchus thaleichthys</u>	Longfin smelt		x		x	
<u>Spirinchus starksii</u>	Night smelt			x		
Gadidae						
<u>Merluccius productus</u>	Pacific hake	x		x	x	
<u>Microgadus proximus</u>	Pacific tomcod	x	x	x	x	
Scorpaenidae						
Unidentified rockfish		x	x			
<u>Sebastes melanops</u>	Black rockfish		x			
Hexagrammidae						
<u>Ophiodon elongatus</u>	Lingcod		x		x	
Cottidae						
<u>Leptocottus armatus</u>	Pacific staghorn sculpin	x	x	x	x	
Agonidae						
<u>Agonus acipenserinus</u>	Sturgeon poacher		x		x	
<u>Occella verrucosa</u>	Warty poacher	x	x	x	x	
<u>Stellerina xyosterna</u>	Pricklebreast poacher	x			x	

Appendix C Table C-4.--Continued.

Scientific name	Common name	Year			
		1989	1990	1991	1992
Cyclopteridae					
Unidentified snailfish		x			
<i>Liparis pulchellus</i>	Showy snailfish		x	x	x
Bothidae					
Unidentified sanddab		x	x	x	x
<i>Citharichthys sordidus</i>	Pacific sanddab	x	x	x	x
<i>Citharichthys stigmaeus</i>	Speckled sanddab		x	x	x
Pleuronectidae					
Larval flatfish		x	x		
<i>Eopsetta jordani</i>	Petrale sole	x	x	x	x
<i>Glyptocephalus zachirus</i>	Rex sole	x	x	x	x
<i>Isopsetta isolepis</i>	Butter sole	x	x	x	x
<i>Lyopsetta exilis</i>	Slender sole			x	
<i>Microstomus pacificus</i>	Dover sole	x		x	x
<i>Parophrys vetulus</i>	English sole	x	x	x	x
<i>Platichthys stellatus</i>	Starry flounder			x	x
<i>Pleuronichthys decurrens</i>	Curlfin sole				x
<i>Psettichthys melanostictus</i>	Sand sole	x	x	x	x
Invertebrates					
Loliginidae					
<i>Loligo opalescens</i>	Common squid	x	x		
Octopodidae					
<i>Octopus dofleini</i>	Giant octopus				x
Canceridae					
<i>Cancer magister</i>	Dungeness crab	x	x	x	
<i>Cancer gracilis</i>	Graceful crab		x		
Crangonidae					
<i>Crangon franciscorum</i>	California bay shrimp	x	x	x	x
<i>Crangon alaskensis</i>	Northern shrimp	x	x	x	x
<i>Lissocrangon stylirostris</i>	Smooth shrimp		x	x	x
Pandalidae					
<i>Pandalus platycerus</i>	Prawn				x
Luidiidae					
<i>Luidia foliolata</i>	Sand star	x	x	x	
Total number of taxa		25	31	26	32

Appendix C Table C-5.--Summary of 8-m trawling efforts at and adjacent to ODMDS F, offshore from the Columbia River in June\July\August 1989, 1990, 1991, and 1992.

Station: FS

Gear: 8-m Trawl  
 Date: 21 Jun 1989  
 Depth: 41.1 m  
 Distance traveled: 241 m

Species	Number captured	Total wt.(g)	Number per hectare	Wt.(g) per hectare
Big skate	1	434	8	3,602
Whitebait smelt	1,050	6,181	8,714	51,295
Pacific tomcod	17	541	141	4,490
Pacific staghorn sculpin	1	140	8	1,162
Warty poacher	4	61	33	506
Unidentified sanddab	12	26	100	216
Pacific sanddab	80	11,348	664	94,174
Petrale sole	9	2,118	75	17,577
Rex sole	1	105	8	871
Butter sole	33	1,317	274	10,929
English sole	29	3,817	241	31,676
Dover sole	1	287	8	2,382
Dungeness crab	3	1,367	25	11,344
Northern crangon	67	102	556	846
Sand star	2	6	17	50
TOTALS	1,310	27,850	10,872	231,120

H = 1.26      J = 0.32

Appendix C Table C-5.--Continued.

Station: FM

Gear: 8-m Trawl  
 Date: 21 Jun 1989  
 Depth: 41.1 m  
 Distance traveled: 852 m

Species	Number captured	Total Wt.(g)	Number per hectare	Wt.(g) per hectare
Spiny dogfish	1	873	2	2,049
Big skate	1	103	2	242
Larval smelt	3	0	7	0
Whitebait smelt	75	354	176	831
Pacific hake	2	1,461	5	3,430
Pacific tomcod	112	3,700	263	8,685
Pacific staghorn sculpin	6	969	14	2,275
Warty poacher	11	192	26	451
Unidentified sanddab	16	15	38	35
Pacific sanddab	130	16,396	305	38,488
Petrale sole	9	2,489	21	5,843
Rex sole	1	219	2	514
Butter sole	116	23,709	272	55,655
English sole	79	7,909	185	18,566
Sand sole	1	226	2	531
Dover sole	4	1,064	9	2,498
Dungeness crab	7	3,032	16	7,117
Northern crangon	141	203	331	477
Sand star	3	3	7	7
TOTALS	718	62,917	1,683	147,694

H = 3.04      J = 0.72

Appendix C Table C-5.--Continued.

Station: FN

Gear: 8-m Trawl  
 Date: 21 Jun 1989  
 Depth: 41.1 m  
 Distance traveled: 463 m

Species	Number captured	Total wt. (g)	Number per hectare	Wt. (g) per hectare
Big skate	1	279	4	1,205
Larval smelt	20	0	86	0
Pacific hake	10	6,415	43	27,711
Pacific tomcod	54	1,315	233	5,680
Unidentified rockfish	2	2	9	9
Pacific staghorn sculpin	1	161	4	695
Warty poacher	9	80	39	346
Pricklebreast poacher	35	19	151	82
Unidentified snailfish	4	0	17	0
Unidentified sanddab	11	12	48	52
Pacific sanddab	2	304	9	1,313
Rex sole	1	187	4	808
Butter sole	62	3,358	268	14,505
English sole	29	5,187	125	22,406
Dover sole	2	441	9	1,905
Larval flatfish	1	0	4	0
Dungeness crab	8	1,448	35	6,255
Northern crangon	88	95	380	410
California bay shrimp	95	206	410	890
Sand star	5	14	22	60
Common squid	1	43	4	186
TOTALS	441	19,566	1,904	84,518

H = 3.28      J = 0.75

Appendix C Table C-5.--Continued.

Station: FS

Gear: 8-m Trawl  
 Date: 12 Jun 1990  
 Depth: 41.8 m  
 Distance traveled: 1,204 m

Species	Number captured	Total wt. (g)	Number per hectare	Wt. (g) per hectare
Pacific herring	44	933	73	1,550
Northern anchovy	27	810	45	1,346
Surf smelt	1	34	2	56
Whitebait smelt	1,186	9,071	1,970	15,068
Pacific tomcod	3	44	5	73
Pacific staghorn sculpin	4	613	7	1,018
Pacific sanddab	40	5,455	66	9,061
Petrale sole	1	138	2	229
Rex sole	1	240	2	399
English sole	52	6,595	86	10,955
Northern crangon	13	18	22	30
TOTALS	1,372	23,951	2,280	39,785

H = 0.91      J = 0.26

Appendix C Table C-5.--Continued.

Station: FM

Gear: 8-m Trawl  
 Date: 12 Jun 1990  
 Depth: 36.9 m  
 Distance traveled: 889 m

Species	Number captured	Total wt.(g)	Number per hectare	Wt.(g) per hectare
Big skate	2	407	4	916
Pacific herring	37	749	83	1,685
Northern anchovy	16	514	36	1,156
Surf smelt	2	57	4	128
Longfin smelt	1	9	2	20
Whitebait smelt	9,472	49,489	21,309	111,336
Pacific tomcod	79	3,792	178	8,531
Unidentified rockfish	1	1	2	2
Lingcod	8	80	18	180
Pacific staghorn sculpin	25	3,702	56	8,328
Sturgeon poacher	1	9	2	20
Warty poacher	5	95	11	214
Pacific sanddab	134	13,004	301	29,255
Speckled sanddab	5	90	11	202
Petrale sole	2	610	4	1,372
Rex sole	1	156	2	351
Butter sole	31	1,011	70	2,274
English sole	186	19,909	418	44,790
Sand sole	21	1,613	47	3,629
Larval flatfish	8	13	18	29
Dungeness crab	1	450	2	1,012
Cancer gracilis	1	8	2	18
Northern crangon	70	106	157	238
California bay shrimp	1	3	2	7
Sand star	1	10	2	22
Common squid	1	25	2	56
TOTALS	10,112	95,912	22,743	215,771

H = 0.54      J = 0.11

Appendix C Table C-5.--Continued.

Station: FN

Gear: 8-m Trawl  
 Date: 12 Jun 1990  
 Depth: 37.8 m  
 Distance traveled: 523 m

Species	Number captured	Total wt. (g)	Number per hectare	Wt. (g) per hectare
Big skate	1	271	4	1,036
Pacific herring	1	25	4	96
Longfin smelt	78	473	298	1,809
Larval smelt	48	48	184	184
Whitebait smelt	114	691	436	2,642
Pacific tomcod	76	3,530	291	13,499
Black rockfish	1	2,210	4	8,451
Unidentified rockfish	6	6	23	23
Lingcod	6	54	23	207
Pacific staghorn sculpin	30	4,766	115	18,226
Warty poacher	2	51	8	195
Showy snailfish	3	132	11	505
Pacific sanddab	19	1,389	73	5,312
Speckled sanddab	23	233	88	891
Butter sole	192	4,312	734	16,489
English sole	36	4,813	138	18,405
Sand sole	30	2,053	115	7,851
Larval flatfish	27	0	103	0
Larval sanddab	61	72	233	275
Dungeness crab	4	1,788	15	6,837
Northern crangon	184	197	704	753
California bay shrimp	47	58	180	222
Smooth crangon	1	1	4	4
Sand star	2	10	8	38
TOTALS	992	27,183	3,796	103,950

H = 3.59      J = 0.78

Appendix C Table C-5.--Continued.

STATION:FM

Gear: 8-m Trawl  
 Date: 7 Aug 1991  
 Depth: 38.1 m  
 Distance traveled: 492 m

Species	No. Captured	Total Wt. (g)	No. Per Hectare	Wt. Per Hectare
Unidentified juv. smelt	3	3	12	12
Whitebait smelt	125	1,171	508	4,760
Pacific tomcod	9	178	37	724
Pacific staghorn sculpin	1	123	4	500
Warty poacher	1	36	4	146
Pacific sanddab	46	4,631	187	18,825
Speckled sanddab	5	54	20	220
Petrale sole	1	151	4	614
Butter sole	5	289	20	1,175
English sole	142	11,770	577	7,846
Sand sole	4	514	16	2,089
Dover sole	2	174	8	707
Northern crangon	15	14	61	59
California bay shrimp	6	6	24	27
Smooth crangon	3	0	12	2
TOTALS	368	19,115	1,494	77,706

H = 2.31      J = 0.59

Appendix C Table C-5.--Continued.

STATION:FS

Gear: 8-m Trawl  
 Date: 7 Aug 1991  
 Depth: 33.5 m  
 Distance traveled: 373 m

Species	No. Captured	Total Wt. (g)	No. Per Hectare	Wt. Per Hectare
Big skate	1	700	5	3,753
Larval smelt	6	6	32	32
Whitebait smelt	4	21	21	113
Pacific tomcod	30	35	161	188
Pacific staghorn sculpin	6	811	32	4,349
Pacific sanddab	168	16,182	901	86,767
Speckled sanddab	14	155	75	831
Petrale sole	6	1,163	32	6,236
Butter sole	3	237	16	1,271
English sole	481	34,435	2,579	184,638
Sand sole	8	1,498	43	8,032
Northern crangon	15	167	80	895
California bay shrimp	5	60	27	322
Smooth crangon	2	6	11	32
TOTALS	749	55,476	4,015	297,459

H = 1.69      J = 0.44

Appendix C Table C-5.--Continued.

STATION:FN

Gear: 8-m Trawl  
 Date: 7 Aug 1991  
 Depth: 38.4 m  
 Distance traveled: 383 m

Species	No. Captured	Total Wt. (g)	No. Per Hectare	Wt. Per Hectare
Big skate	14	9,031	73	47,159
Pacific herring	1	25	5	131
Unidentified juv. smelt	13	13	68	68
Whitebait smelt	10	79	52	413
Pacific hake	2	1,186	10	6,193
Pacific tomcod	123	644	642	3,363
Pacific staghorn sculpin	9	981	47	5,123
Warty poacher	15	322	78	1,681
Showy snailfish	2	97	10	507
Unidentified sanddab	2	2	10	10
Pacific sanddab	23	3,263	120	17,039
Speckled sanddab	9	79	47	413
Rex sole	3	344	16	1,796
Butter sole	53	3,959	277	20,674
Slender sole	3	163	16	851
English sole	241	33,105	1,258	172,872
Starry flounder	1	776	5	4,052
Sand sole	13	1,896	68	9,901
Dover sole	31	3,647	162	19,044
Dungeness crab	1	395	5	2,063
Northern crangon	43	600	225	3,133
California bay shrimp	7	77	37	402
Smooth crangon	4	18	21	94
Sand star	2	116	10	606
TOTALS	625	60,818	3,262	317,588

H = 3.05      J = 0.67

Appendix C Table C-5.--Continued.

Station: FM

Gear: 8-m trawl

Date: 1 Jul 1992

Depth: 37.8 m

Distance traveled: 426 m

Species	No. Captured	Total Wt.(g)	No. Per Hectare	Wt.(g) Per Hectare
Spiny dogfish	2	2,406	9	11,296
Big skate	1	73	5	343
Pacific herring	1	47	5	221
Whitebait smelt	2,970	15,130	13,944	71,033
Pacific tomcod	5	381	23	1,789
Lingcod	6	71	28	333
Pacific staghorn sculpin	32	3,044	150	14,291
Sturgeon poacher	1	16	5	75
Pacific sanddab	264	18,350	1,239	86,150
Speckled sanddab	15	260	70	1,221
Petrale sole	1	282	5	1,324
Butter sole	20	270	94	1,268
English sole	87	7,068	408	33,183
Sand sole	6	785	28	3,685
Dover sole	1	108	5	507
Larval sanddab	40	97	188	455
Dungeness crab	71	24,992	333	117,333
Northern crangon	3	12	14	56
California bay shrimp	1	4	5	19
Smooth crangon	3	4	14	19
TOTALS	3,530	73,400	16,572	344,601

H = 1.03 J = 0.24

Appendix C Table C-5.--Continued.

Station: FS

Gear: 8-m trawl

Date: 1 Jul 1992

Depth: 40.2 m

Distance traveled: 463 m

Species	No. Captured	Total Wt.(g)	No. Per Hectare	Wt.(g) Per Hectare
Pacific tomcod	1	1	4	4
Lingcod	3	43	13	186
Pacific staghorn sculpin	14	1,455	60	6,285
Warty poacher	1	11	4	48
Pacific sanddab	191	15,546	825	67,153
Speckled sanddab	25	359	108	1,551
Rex sole	1	161	4	695
Butter sole	6	295	26	1,274
English sole	118	8,944	510	38,635
Curlfin sole	1	93	4	402
Sand sole	5	335	22	1,447
Dover sole	1	106	4	458
Larval sanddab	79	138	341	596
Dungeness crab	453	161,562	1,957	697,892
Northern crangon	3	49	13	212
Smooth crangon	2	3	9	13
TOTALS	904	189,101	3,904	816,851

H = 2.12 J = 0.53

Appendix C Table C-5.--Continued.

Station: FN

Gear: 8-m trawl

Date: 1 Jul 1992

Depth: 33.2 m

Distance traveled: 389 m

Species	No. Captured	Total Wt.(g)	No. Per Hectare	Wt.(g) Per Hectare
Spiny dogfish	1	1,000	5	5,141
Big skate	1	41	5	211
Pacific herring	1	61	5	314
Longfin smelt	7	27	36	139
Night smelt	27	151	139	776
Unidentified juv. smelt	3	3	15	15
Whitebait smelt	528	2,715	2,715	13,959
Pacific hake	2	1,161	10	5,969
Pacific tomcod	98	5,852	504	30,087
Lingcod	3	80	15	411
Pacific staghorn sculpin	81	9,091	416	46,740
Warty poacher	2	21	10	108
Pricklebreast poacher	2	3	10	15
Showy snailfish	1	37	5	190
Pacific sanddab	5	326	26	1,676
Speckled sanddab	75	485	386	2,494
Butter sole	216	6,517	1,111	33,506
English sole	139	19,587	715	100,704
Starry flounder	4	2,932	21	15,075
Sand sole	21	5,455	108	28,046
Dover sole	2	226	10	1,162
Dungeness crab	21	7,646	108	39,311
Northern crangon	17	134	87	689
California bay shrimp	9	86	46	442
Smooth crangon	69	171	355	879
Prawn	1	63	5	324
Giant octopus	2	12	10	62
TOTALS	1,338	63,883	6,878	328,445

H = 2.94 J = 0.62